

# ADDITIONS AND CORRECTIONS TO: DECRAEMER: THE FAMILY TRICHODORIDAE

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Since the publication of the book of Decraemer (1995), the study of additional specimens has yielded new information on some diagnostic features (e.g. sperm structure, vulva shape) and other characters (e.g. shape of vagina) have been re-interpreted. A more detailed description is given for the pharyngo-intestinal junction in *Paratrichodorus* (Table 1) and for the position of the secretory-excretory pore (S-E pore) in the genus *Trichodorus* (Table 2). Both characters were included in the list of coded characters used in a polytomous key to species of the family Trichodoridae (Decraemer & Baujard, 1998b); the position of the S-E pore was not included in the diagnosis of *Trichodorus* species in Decraemer (1995) since it was not considered of diagnostic value in that genus.

## New data

### POSITION OF SECRETORY-EXCRETORY PORE (S-E PORE)

The position of the S-E pore in the species of the genus *Trichodorus* is given in Table 2. In *P. tunisiensis* females, the S-E pore may also be found at the level of the posterior end of the isthmus. In *Allotrichodorus loofi*, the S-E pore is found opposite the posterior isthmus in males and opposite the posterior isthmus or the anterior part of the pharyngeal bulb in females; in *A. sharmae*, the S-E pore in males and females is opposite the anterior part of the pharyngeal bulb.

### SHAPE OF VAGINA

The most common shape of the vagina is pear-shaped in *T. cedarus*, *T. lusitanicus*, and *Monotrichodorus sacchari*, barrel-shaped with wide base in *T. intermedius*, barrel-shaped or pear-shaped in *T. cylindricus*, barrel-shaped in *T. obscurus* and *P. pachydermus*, rhomboid or wide rounded in *T. philipi* and rhomboid with greatest width at mid-level in *P. teres*, wide rounded in *P. lobatus*, *P. paramirzai*, and wide trapezoidal in *P. meyeri* and *P. mirzai*.

### SPERM STRUCTURE

Sperm is medium-sized and oval with small sausage-shaped nucleus in *T. obtusus* and *P. paraporosus*, medium-sized and round with round nucleus in *T.*

*californicus*, *T. borai*, *T. complexus*, *M. samericus*, and *M. monohystera monohystera*, large and round with round nucleus in *T. elegans*, *T. intermedius*, and *T. obscurus*, and large and oval with large sausage-shaped nucleus in *T. borneoensis* and *T. sanniae*.

### VULVA SHAPE IN VENTRAL VIEW

The vulva is a longitudinal slit in *T. rinae*, a transverse slit in *T. californicus*, and a pore in *T. eburneus* (Senegalese population).

### ADDITIONAL GEOGRAPHIC RECORDS

*T. eburneus* has been recorded from tropical rain forest in Cameroon (Sturhan, pers. comm.), *T. obtusus* from Pakistan (Maqbool & Nasira, 1995), *P. meyeri* and *T. rinae* from Florida (Anon., 1995, 1996), *P. renifer* from South Africa and Brazil (Braasch & Sturhan, 1991), *P. minor* from Fujian Province, China (specimens collection Ye), Nigeria (Khan, 1990), Pakistan (Maqbool, 1992), and Egypt (Tarjan, 1964), *P. teres* from Egypt (Tarjan, 1964), *T. similis* from Greece (Brown *et al.*, 1995), *T. sparsus* and *T. viruliferus* from Hungary (Andrássy, pers. comm.), and *T. primitivus*, *T. sparsus*, *T. variopapillatus*, *T. viruliferus*, and *T. christiei* (= *P. minor*) from Hungary (Andrássy, 1990).

### NEW DATA ON ECOLOGY

Baujard and Martiny (1995) provided the first data on ecology and pathogenicity of four trichodorid species in a semi-arid region of West Africa. Laboratory studies showed that these species require relatively low soil temperature levels for reproduction. The trichodorids are not able to enter anhydrobiosis. Their localization at depths below 50 cm is probably a response to soil desiccation during the dry season and to high soil temperatures in the upper layers of the soil during the rain season.

### SPECIES RECENTLY DESCRIBED

Since the publication of the book of Decraemer (1995), six new species have been described: *Trichodorus altaicus* De Waele & Brzeski, 1995, *T. reduncus* Siddiqi & Sharma, 1995, *T. variabilis* Roca, 1988, *Monotrichodorus samericus* Marais, Swart & Heyns, 1995, *Paratrichodorus caribensis* Marais, Decraemer

**Table 1.** Type of pharyngo-intestinal junction in the genus *Paratrichodorus*.

Species	Offset bulb		Ventral overlap		Dorsal overlap		Both overlaps	
	male	female	male	female	male	female	male	female
<i>P. acaudatus</i>		*	*					
<i>P. acutus</i> (no male)		*		rare				
<i>P. allenii</i> (no female)			*					
<i>P. allius</i>			*	*				rare
<i>P. anemones</i>		rare	*	*				
<i>P. anthurii</i> (no male)		*						
<i>P. atlanticus</i>	rare				*	*		
<i>P. caribensis</i>		*		rare				
<i>P. catharinae</i>			*	*	*	*		
<i>P. delhiensis</i>	*	*						
<i>P. grandis</i>		rare			*	*		
<i>P. hispanus</i>					*	*		
<i>P. lobatus</i>			*	*				
<i>P. macrostylus</i>			*	*				
<i>P. meyeri</i>				rare		rare	*	*
<i>P. minor</i> (male rare)	rare	rare	*	*				
<i>P. mirzai</i>	*	*	rare		*	*		
<i>P. namibiensis</i>							*	*
<i>P. nanus</i> (male rare)	*	*						
<i>P. orrae</i>	*	*			*	*		
<i>P. paramirzai</i>	*	*	*	*				
<i>P. pachydermus</i>	rare	rare	rare	rare	*	*	rare	rare
<i>P. paraporosus</i>			*	*				
<i>P. porosus</i>		rare		rare	*	*		
<i>P. queenslandensis</i>	*	*			*	*		
<i>P. renifer</i> (no male)		*		rare				
<i>P. rhodesiensis</i>			*	*				
<i>P. sacchari</i>						*	*	*
<i>P. teres</i>		rare	*	*	rare	*	rare	*
<i>P. tunisiensis</i>			*	*				
<i>P. weischeri</i>					*	*		

& Quénéhervé, 1997, and *P. namibiensis* Marais & Botha-Greeff, 1997.

*T. altaicus* may be added to the key to males of *Trichodorus* at page 261, couplet 29 behind *T. sparsus* as:  
 - manubrium wide, gradually tapered, mid-shaft with striae, no bristles; ventromedian cervical papillae posterior to nerve ring—  
 and to the key to females of *Trichodorus* at page 268, couplet 41 behind *T. aequalis* as:  
 - Vaginal sclerotizations small triangular; mean onchiostyle 41 µm; body length 571–727 µm; known from Asian part of Russian Federation.

*T. reduncus* may be added to the key to males of *Trichodorus* at page 263, couplet 46 behind *T. tricaulatus* as:

- spicules slightly curved; manubrium not offset; shaft smooth, no bristles; onchiostyle 36–40 µm—  
 and to the key to females of *Trichodorus* at page 267, couplet 34 behind *T. paracedarus* as:  
 - onchiostyle 37–40 µm; vulva a transverse slit; vagina 1/3rd body width long; vaginal sclerotized pieces rounded to triangular, well separated.

*T. variabilis* may be added to the key to males of *Trichodorus* at page 262, couplet 33 behind *T. sparsus*

**Table 2.** Position of secretory-excretory pore in *Trichodorus* species.

Species	Opposite isthmus		Ant. 2/3rd of bulb		Post. 1/3rd of bulb, ant. intestine	
	male	female	male	female	male	female
<i>T. aequalis</i>		*	*	*		
<i>T. altaicus</i>			*	*		
<i>T. aquitanensis</i>	*	*				
<i>T. azorensis</i>			*	*		
<i>T. beirensis</i>	(*)	(*)	*	*		
<i>T. borai</i>	*	*				
<i>T. borneoensis</i>	*	*				
<i>T. californicus</i>	*			*		
<i>T. carlingi</i>			*	*		
<i>T. cedarus</i>			*	*		
<i>T. complexus</i>	*	*				
<i>T. coomansi</i>	(*)		*	*		
<i>T. cottieri</i>	*	*				
<i>T. cylindricus</i>	(*)	(*)	*	*		
<i>T. dilatatus</i>			*	*		
<i>T. eburneus</i>	*	*				
<i>T. effjohnsoni</i>		*	*			
<i>T. elegans</i>			*	*		
<i>T. giennensis</i>			*	*		
<i>T. hooperi</i>	(*)	(*)	*	*		
<i>T. intermedius</i>		*	*			
<i>T. kilianae</i>			*	*		
<i>T. lusitanicus</i>	*	*				
<i>T. magnus</i>			*	*		
<i>T. minzi</i>			*	*		
<i>T. nanjingensis</i>			*	*		
<i>T. obscurus</i>	*		*	*		
<i>T. obtusus</i>	(*)		*	*		
<i>T. orientalis</i>	*	*				
<i>T. pakistanensis</i>	*	*				
<i>T. paracedarus</i>	(*)	(*)	*	*		
<i>T. parorientalis</i>			*	*		
<i>T. paucisetosus</i>	*	*	*	*		
<i>T. persicus</i>	(*)		*	*		
<i>T. petrusalberti</i>			(*)	(*)	*	*
<i>T. philipi</i>					*	*
<i>T. primitivus</i>	*	*	(*)	(*)		
<i>T. reduncus</i>			*	*		

(End of Table 2 next page)

Table 2. (cont.)

Species	Opposite isthmus		Ant. 2/3rd of bulb		Post. 1/3rd of bulb, ant. intestine	
	male	female	male	female	male	female
<i>T. rinae</i>			*	*	*	*
<i>T. sanmiae</i>					*	*
<i>T. similis</i>	*	*	(*)	(*)		
<i>T. sparsus</i>	*	*	(*)	(*)		
<i>T. taylori</i>			*	*		
<i>T. tricaulatus</i>	*	*	*	*		
<i>T. vandenbergae</i>		*	*			
<i>T. variabilis</i>			*	*		
<i>T. variopapillatus</i>	*	*				
<i>T. velatus</i>	(*)		*	*		
<i>T. viruliferus</i>	(*)		*	*		
<i>T. yokooi</i>	(*)		*	*		

\* = common; (\*) = less common

(when one precloacal supplement is present in the region of retracted spicules) as:

- posterior precloacal supplement opposite spicule head; terminal tail cuticle not thickened; spicule shaft without bristles; spicule length 44-51.5 µm; onchiostyle 47.5- 59.5 µm-

and at page 262, couplet 34 behind *T. lusitanicus* (when there are no precloacal supplements in the region of retracted spicules) as:

- spicule shaft equally wide, smooth; manubrium widened, not offset; spicule length 44-51.5 µm; onchiostyle 47.5-59.5 µm.

This species can be added to the key to females of *Trichodorus* at page 267, couplet 38 behind *T. giennensis* as:

- mean onchiostyle length 54 µm; body length 851-1041 µm; known from Greece.

*Monotrichodorus samericus* can be differentiated from the other species of the genus by the far anterior position of the S-E pore near the base of the onchiostyle in both sexes and also by the position of the single ventromedian cervical papilla in the onchiostyle region in males.

*P. caribensis* may be added to the key to the females of *Paratrachodorus* at page 274, couplet 6, behind *P. nanus* as:

- S-E pore just anterior or posterior to pharyngo-intestinal junction; onchiostyle 37-41 µm; pharyngeal bulb usually offset, ventral overlap less common; sperm unknown; vaginal sclerotizations comma-shaped. Males unknown.

*P. namibiensis* may be added to the key to males of *Paratrachodorus* at page 270, couplet 8, between *P. alleni* and *P. lobatus* as:

- S-E pore opposite posterior part of pharyngeal isthmus; bursa extending halfway to the retracted spicules; sperm thread-like; known from Namibia- and to the key to females of *Paratrachodorus* at page 277, couplet 30 behind *P. meyeri* as:

- sperm thread-like; onchiostyle 50-55 µm; body length 699-1137 µm; vulva a longitudinal slit; two to four lateral body pores; vaginal sclerotizations narrow triangular, well separated.

#### Remarks

(1) *P. namibiensis* was described with both types of pharyngeal overlaps, but the anterodorsal intestinal overlap is minute to short and, in some specimens, it could be a fixation artefact;

(2) according to the author, thread-like sperm (*i.e.*, without nucleus) could also include sperm with tread-like appearances (nucleus present).

#### Corrections for Decraemer's book (1995)

(Some of these corrections were included in the book under Corrigenda)

Page 8, line 17,22: for "corpus" read "pharyngostom"

Page 10, line 23: for "posterior region" read "mid-region"; add "Bird (1971) observed a lumen in the posterior intestine of *P. porosus*, but no cell boundaries, microvillous layer or granular regions."

Page 21, line 5: for "*Paratrichodorus*" read "*Trichodorus*"

Page 22, line 14: for "*Trichodorus*" read "*Paratrichodorus*"

Page 25, Fig. 2.6: read: "Dispersion of onchiostyle length in a population of *T. primitivus* and *T. similis* (after Decraemer, 1979)".

Page 26, lines 3,7: read: "Trichodoridae Thorne, 1935 (Clark, 1961)"; line 6: "Trichodoridae Thorne, 1935 (Siddiqi, 1974)"

Page 35, line 30: add: "vagina short vs. long";

Page 71, Fig. 3.16: read: "B = *P. tunisiensis* and N = *P. nanus*"

Page 82, line 11: read: "(the anterior one at mid-onchiostyle, the second one opposite the posterior half or base of the onchiostyle region or posterior to it)"

Page 92, line 26: for "18 females" read: "18 males"

Page 110, line 20: a minute add: "dorsal"

Page 117, line 30: roughly triangular add: "to triangular"

Page 118, line 7,8: omit: "*T. obscurus* has only *T. proximus* as synonym"

Page 126, line 11: add: "fine striation of posterior part of shaft"

Page 145, line 23: read: "vagina sclerotizations (medium-sized, roughly triangular to trapezoid)"

Page 173, line 17,18: for "Siddiqi, 1960" read: "Bird, 1967"

Page 217, line 3: Fig. 3.16 B; line 18: "two lateral body pores: one pre- and one postvulvar"

Page 247, line 7: shaft striated add: ", slightly enlarged posteriorly"

Page 252, line 17: in females add: "of type population only"

Page 262, Key to *Trichodorus* males under n° 37 and 38 add, respectively:

- Spicules with slightly indented shaft (Fig. 5.3T)

Spicule length 29-34 µm; onchiostyle 55-66 µm *T. azorensis* \*

- Spicules stouter with slightly indented shaft;

Spicule length 29-34 µm; onchiostyle 55-66 µm *T. azorensis* \*

Page 285, line 4: "onchiostyle = 28-39 µm"

Page 287, line 26: Bongers, 1988 add: "; Braasch & Sturhan, 1991"

Page 291, line 5: "spicule length = 36.5-54 µm"

Page 304, line 15: "onchiostyle = 34-57 µm", line 16: 46 mm add: "34 mm"; line 19: for "Loof, 1963" read: "Loof, 1964"

Page 320, omit "*P. teres* for Portugal", add: "Greece with *T. similis*, Hungary with *T. sparsus* and *T. viruliferus*"

Page 322, omit "*T. primitivus*" in column Asia; add: "*T. cylindricus*" for Oceania, "*T. orientalis*" for Europe;

"*T. rinae*" for North America, and "*T. altaicus*" and "*T. obtusus*" for Asia"

Page 323, add: "*P. renifer* for South America, *P. meyeri* for North America"; omit "*P. pachydermus*" for Asia

Page 324, line 30: for "coarse" read "light"

Page 326, Fig. 7.1: insert: "highest population densities indicated by light punctuation"

Page 343, Baujard, P., 1983: for "8: 35-39" read: "6: 223-228"; Benson, D & Barker, K, 1977: for "*Nematologica*", read: "*Journal of Nematology*"

Page 344, Cobb, N.A., 1913: for "217-343", read: "432-444"

Page 347, Gomez-Barcina & Castillo, 1982: read: "Presencia"

Page 348, Hooper, D.J. & Siddiqi, M.R., 1972: for "*Trichodorus similis*" read: "*T. primitivus*"

Page 349, Kuiper, K., 1977: for "136: 193-200" read: "Serie 555, 140 p."

Page 349, Lister, R.M. & Murant, A.F.: for "*Annals of Applied Biologists*", read: "...*Biology*"

Page 351, for "Popovici, I. 1989", read: "1980"; add "Popovici, I., 1989. A new species of *Paratrichodorus* (Nematoda: Diphtherophorina) from Romania. *Nematologica*, 35: 455-460."

Page 352, Rodriguez-Montessoro, R. & Bell, A.H., 1978: for "132-141", read: "127-132"; add "Rodriguez-Montessoro, R. & Bell, A.H., 1978. Three new species of Trichodoridae (Nematoda: Diphtherophorina) with observations on the vulva in *Paratrichodorus*. *Journal of Nematology*, 10: 132-141."

Page 353, Shishida, Y., 1979: for "(Thorne, 1933)", read: "(Thorne, 1935)"

Page 356, for "Ye, W., 1995", read: "1994" and for "5: 1-2", read: "4: 12-13"; for "Xu, J. & Decraemer, W., 1995: in press", read: "18: 455-464"; for "Yokoo, T., 1964: 23: 1-6", read: "20: 57-62"

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